# Virginia's Biological Monitoring Program

## Jackson River TMDL Meeting

August 30, 2005

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY


Best Management Practices
Sewage Treatment Plant upgrades
Implement Control Measures
Biomonitoring
Lake Monitoring
Stream Monitoring
Watershed Plans
Water Quality Monitoring
DEQ
Virginia Department of Environmental Quality
Water Quality Programs
TMDL Studies
Stressor Identification
Stakeholder Participation
Assessments
305 (b) WQA Report
303 (d) Impaired Waters List

# Biological Monitoring

**A tool for detecting environmental impacts that are too subtle to be detected by standard chemical monitoring networks**

**Why? General Standard => "*all state waters shall be free from substances... which are harmful to aquatic life*"**

- **Benthic macroinvertebrate communities reflect overall ecological integrity (chemical, physical, biological)**
- **Chemical monitoring can miss periodic pollution events and does not assess habitat quality**

**When impairments are discovered, an in-depth investigation must be completed to identify the source(s) of the impairment (TMDL)**

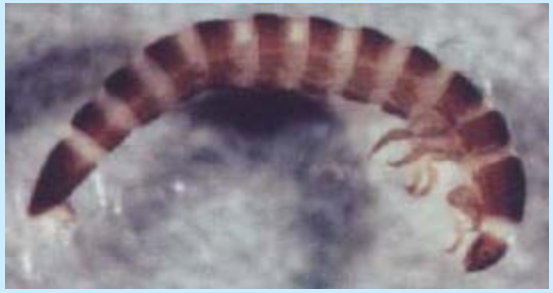
# Intolerant Organisms

Mayfly

Stonefly

Caddisfly

Water Penny



Riffle Beetle

# Moderately Tolerant Organisms

Crayfish

Dragonfly

Netspinning Caddisfly

Aquatic Sowbug

Cranefly

# Tolerant Organisms

Midge Larvae

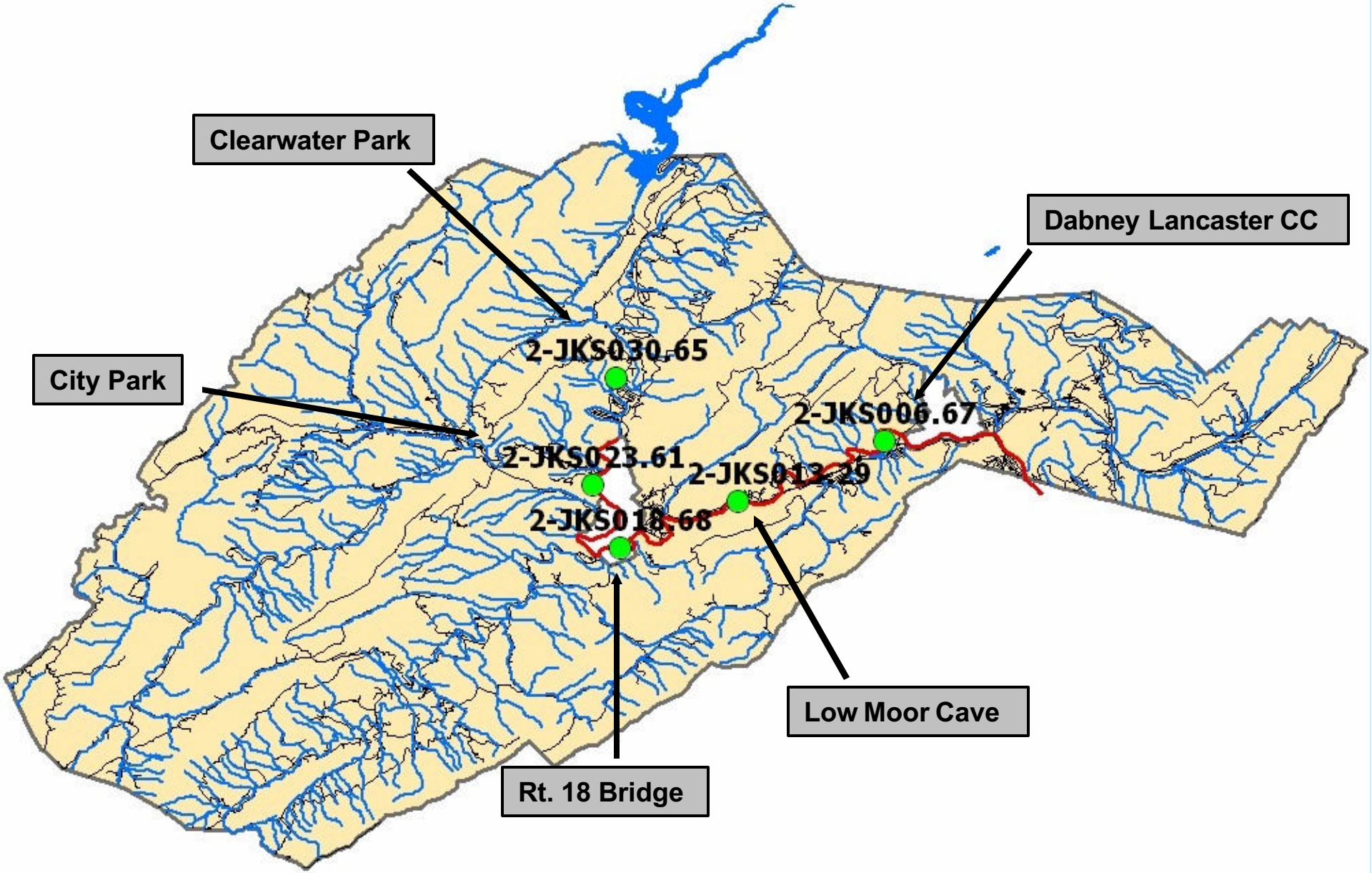
Leech

Pouch Snail

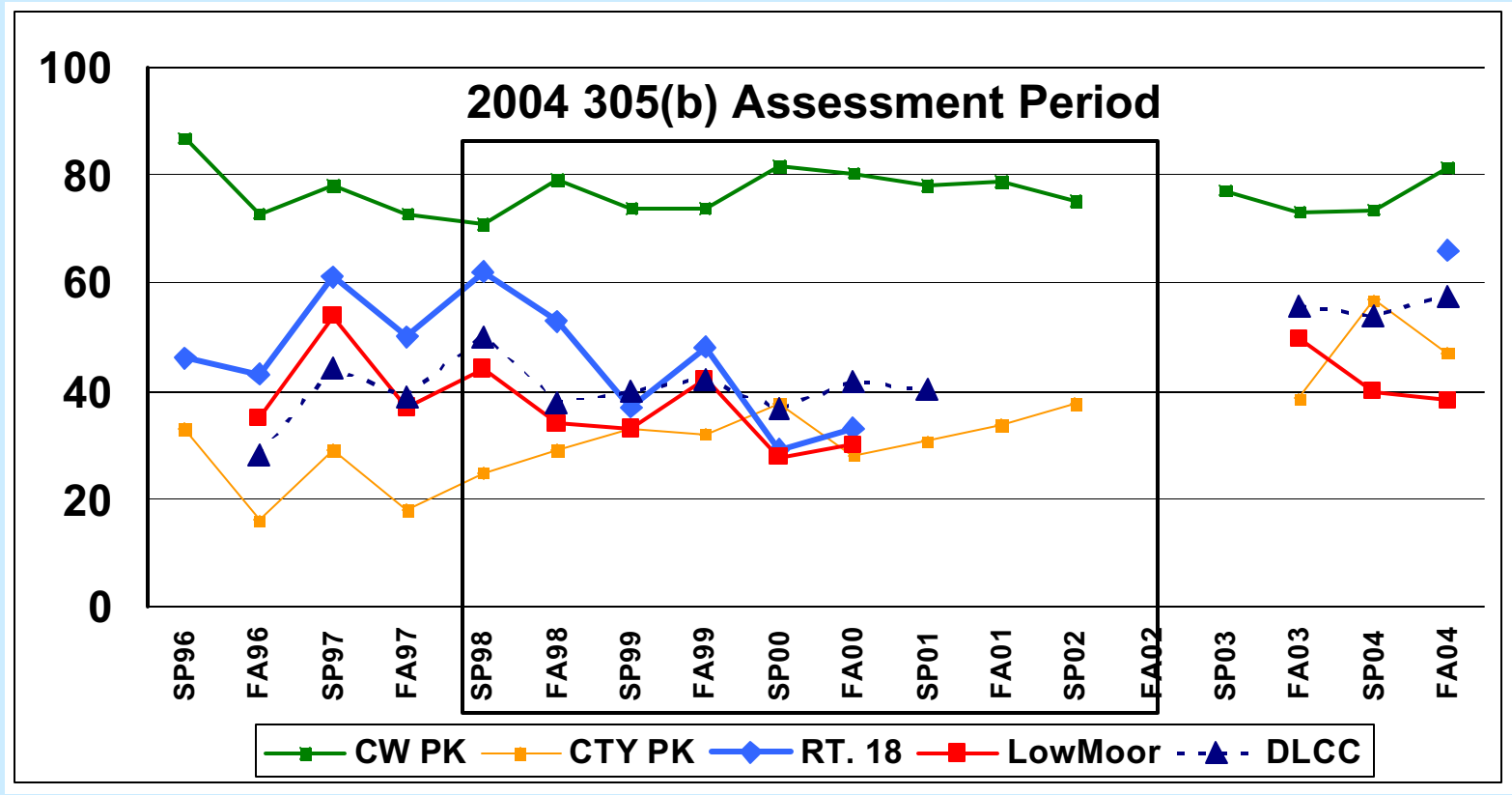
Segmented Worm

Flatworm

# Biological Monitoring Stations



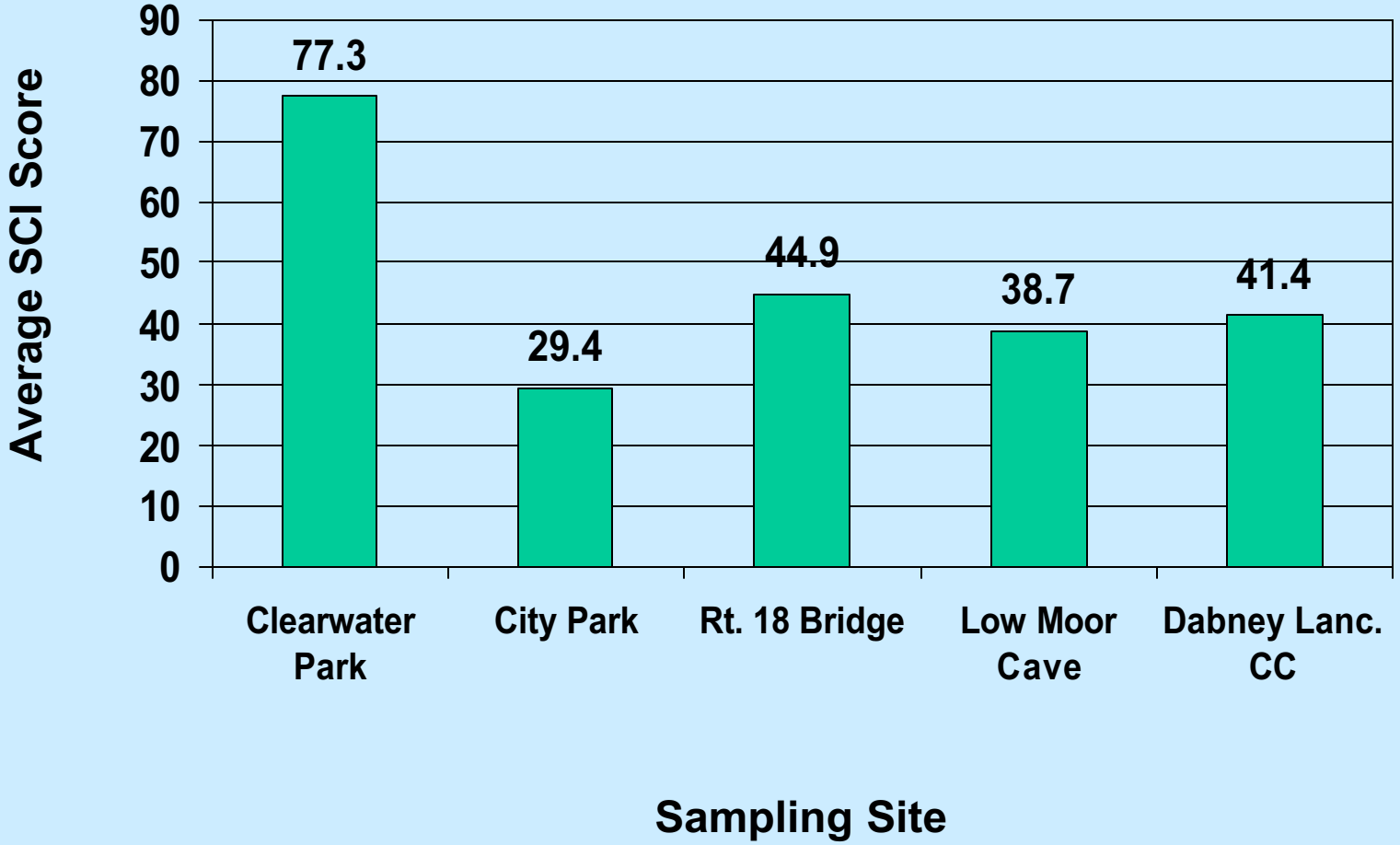
# Jackson River - Stream Condition Index



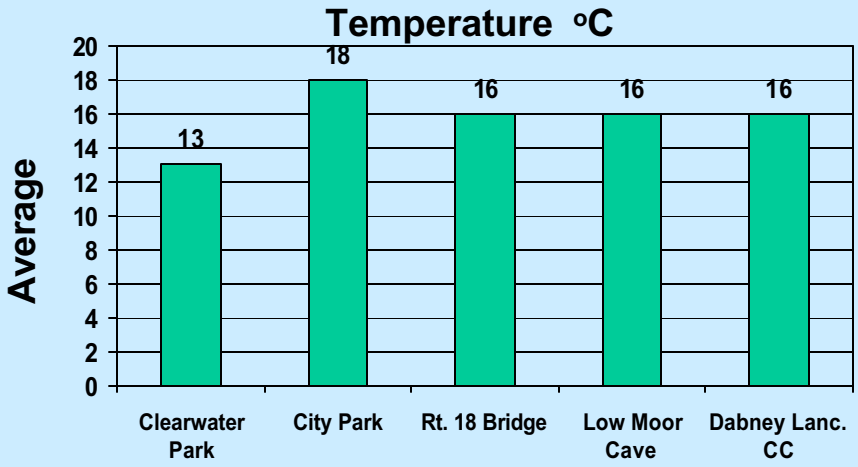

**VA's Stream Condition Index evaluates community:**

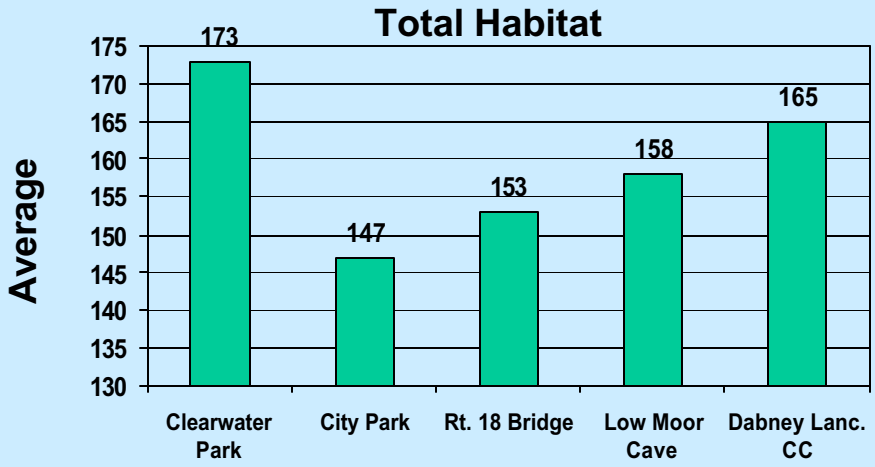
**Diversity** **Pollution Tolerance** **Feeding Modes**

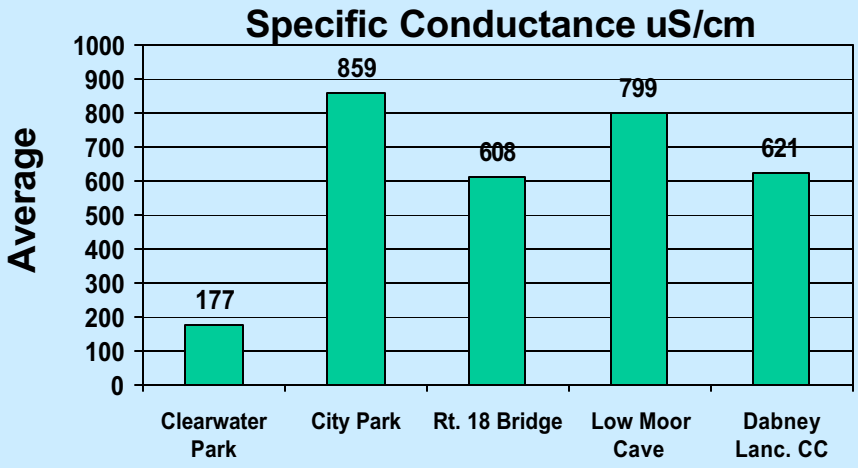
# Stream Condition Index (1994-2004)

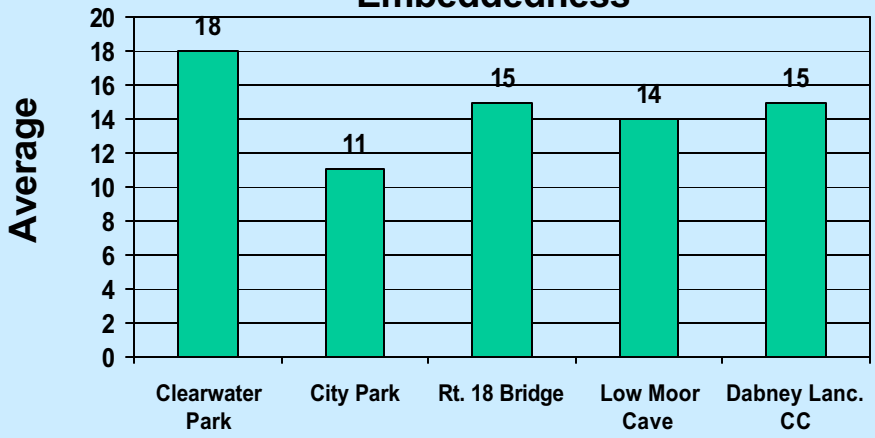


# Chemical/Physical and Habitat Data

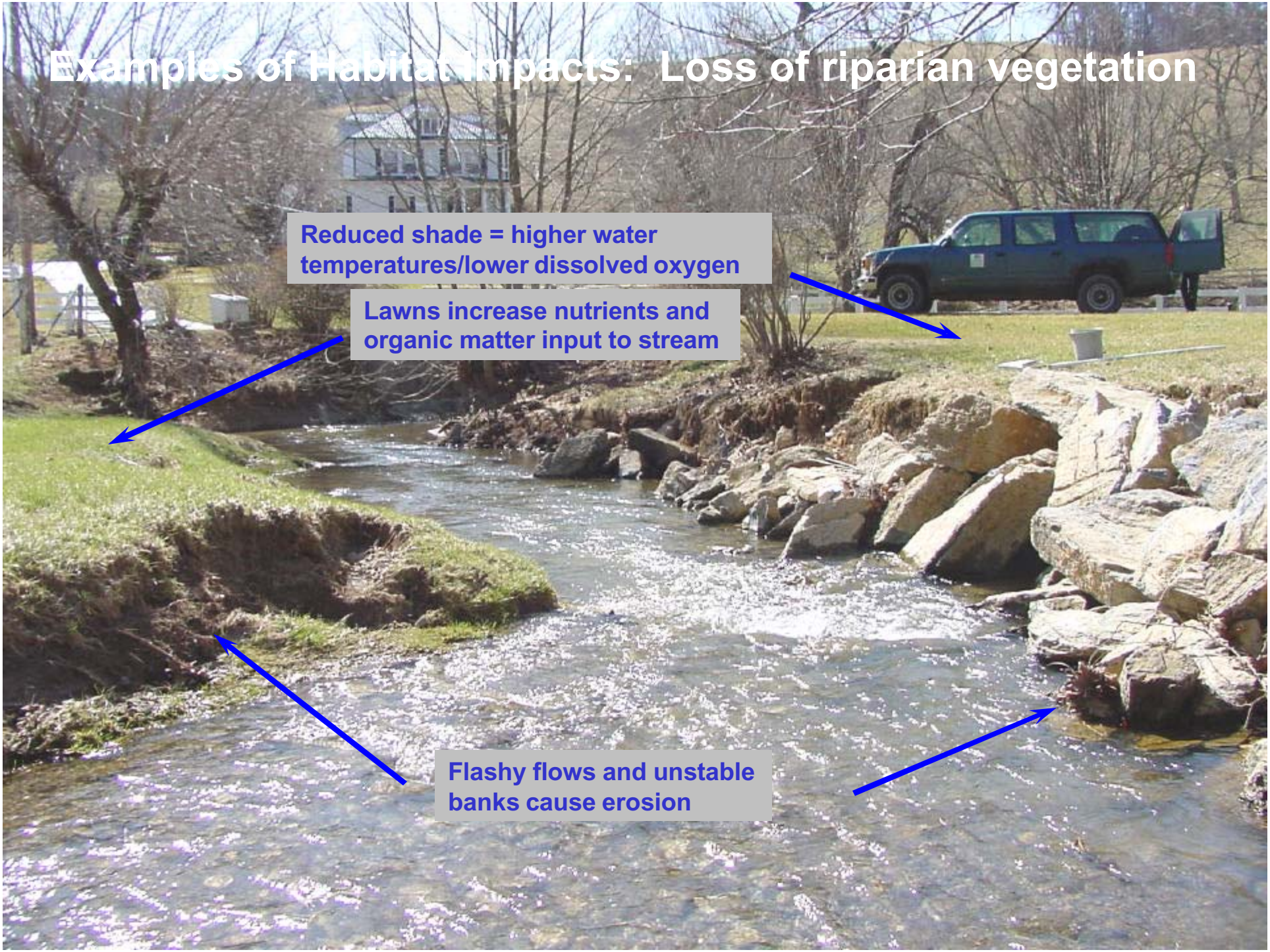


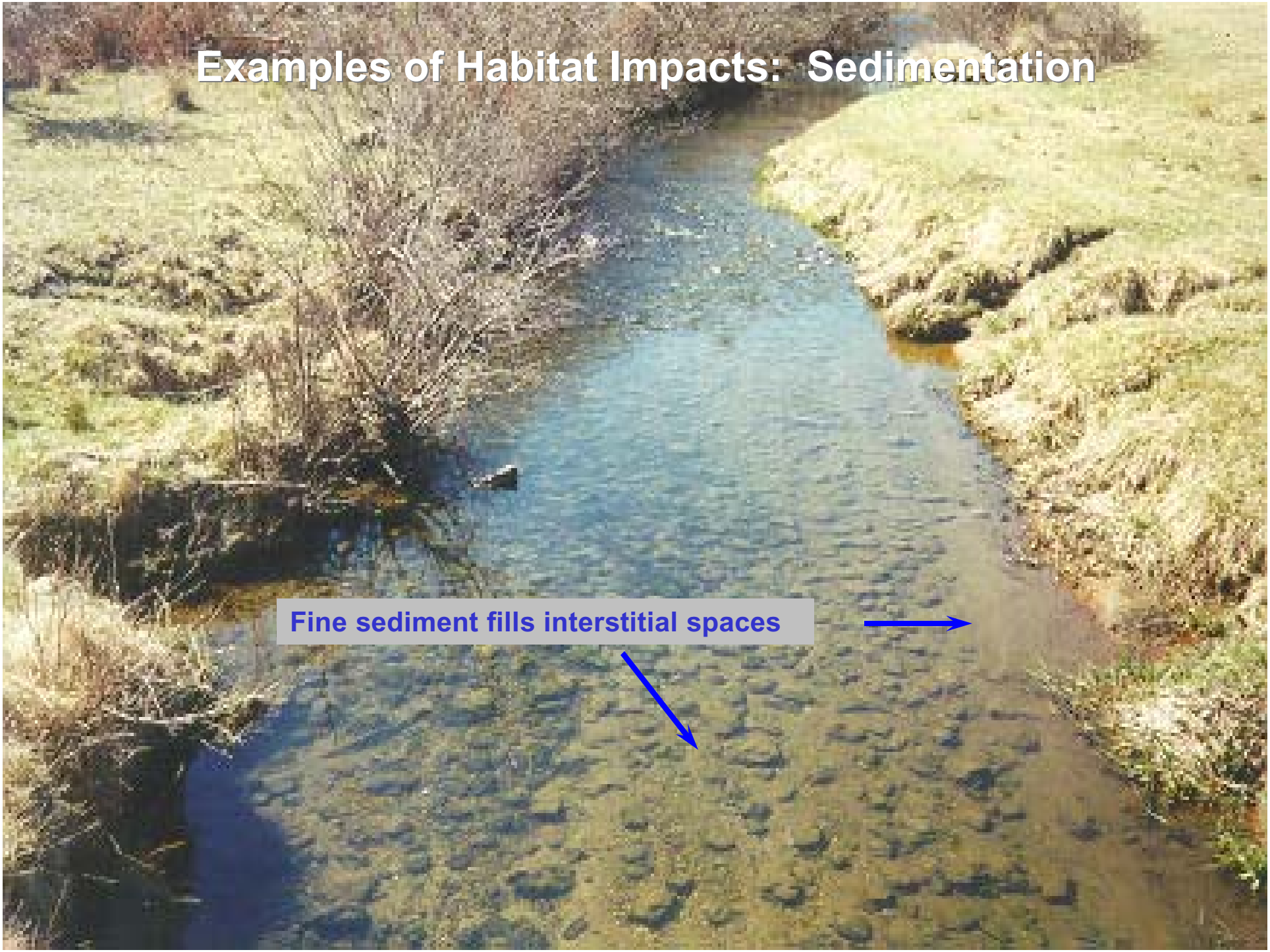



# Examples of Habitat Impacts: Loss of riparian vegetation



# Examples of Habitat Impacts: Channel alteration

# Examples of Habitat Impacts: Sedimentation



# Examples of Habitat Impacts: Excess Nutrients

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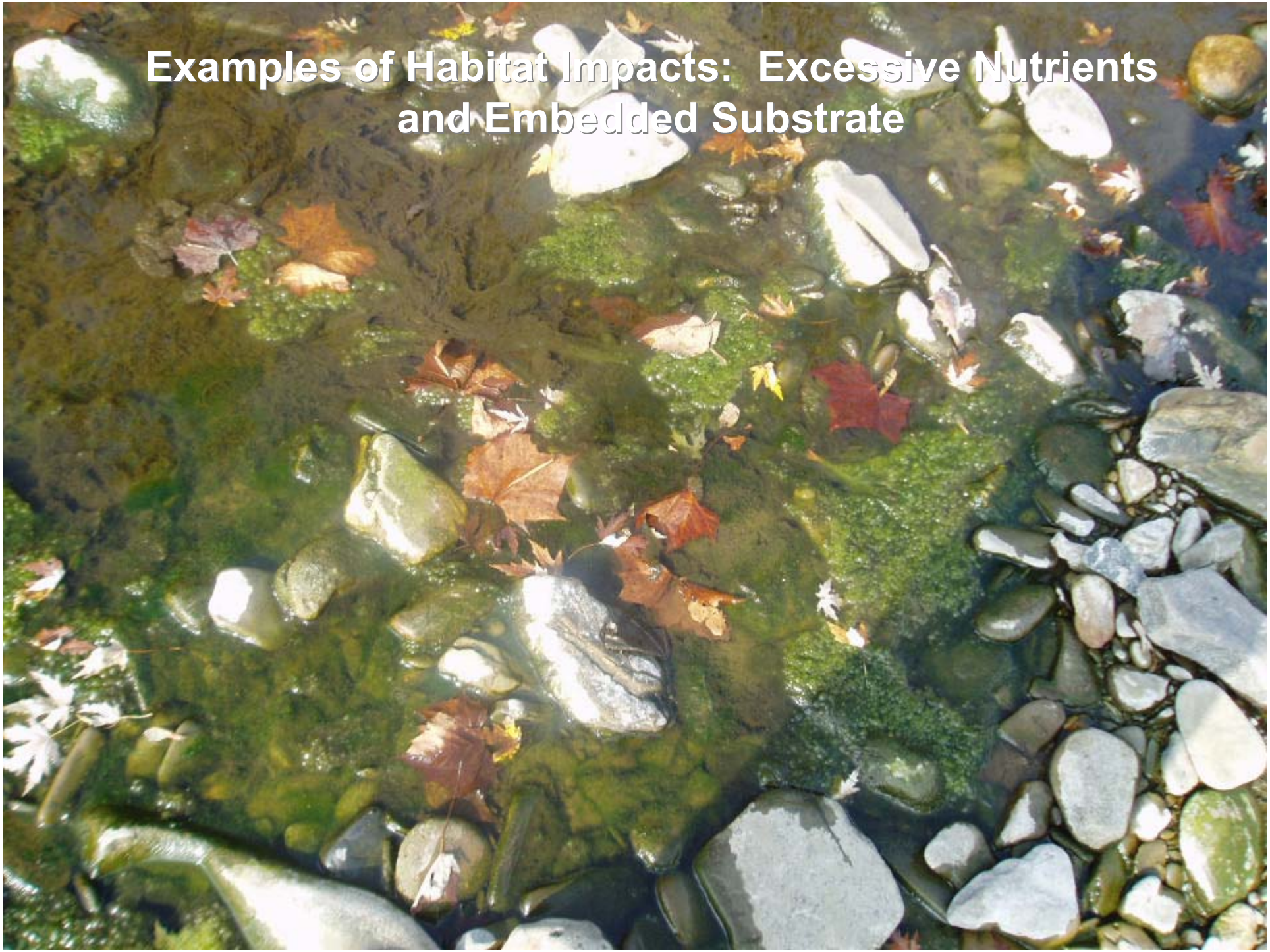
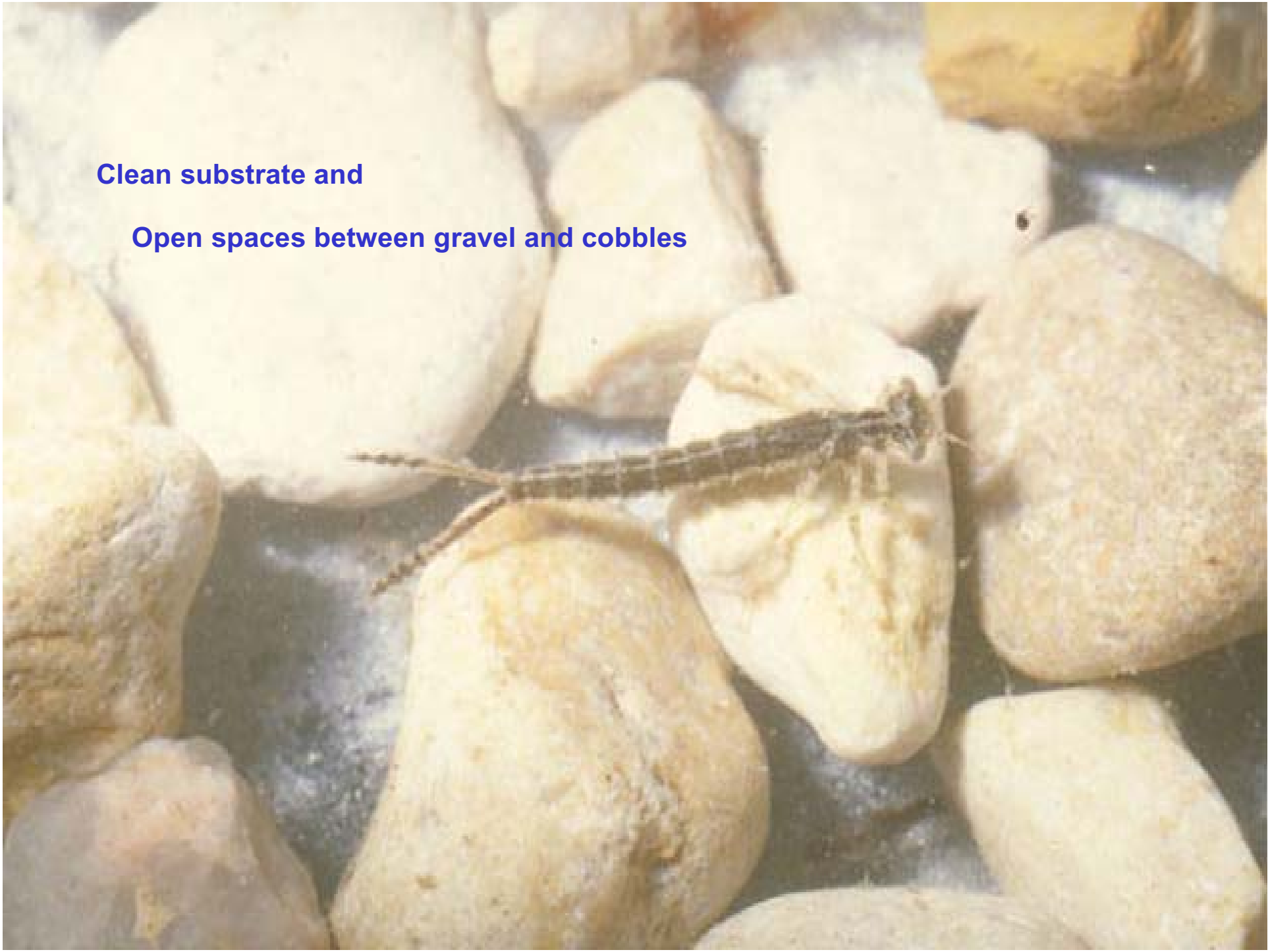
# Examples of Habitat Impacts: Excessive Nutrients and Embedded Substrate


Examples of Habitat Impacts: Excessive Nutrients
and Embedded Substrate


Natural riparian buffers
Shading = less temperature fluctuations and higher dissolved oxygen


Leaf litter and woody debris = natural substrate and food


Clean substrate and
Open spaces between gravel and cobbles

# Summary

- Biological monitoring detects environmental impacts that are too subtle to be detected by standard chemical monitoring networks
- Benthic and habitat surveys detect impacts in the Jackson River